

A Peculiar Condition of Iron

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that this state was only superficial; that when so altered it was inactive in nitric acid; and that when ordinary iron was put into strong nitric acid there was no action, but the metal assumed the *altered* state.

Westlar, whose results I know only from the *Annales des Mines* for 1832¹ observed that iron or steel which had been plunged into a solution of nitrate of silver lost the power of precipitating copper from its solutions; and he attributes the effect to the assumption of a negative electric state by the part immersed, the other part of the iron having assumed the positive state.

Braconnot in 1833² observed that filings or even plates of iron in strong nitric acid are not at all affected at common temperatures, and scarcely even at the boiling-point.

Sir John Herschel's observations are in reality the first which refer these phenomena to electric forces; but Westlar's, which do the same, were published before them. The results obtained by the former, extracted from a private journal dated August 1825, were first published in 1833.³ He describes the action of nitric acid on iron; the altered state which the metal assumes; the superficial character of the change; the effect of the contact of other metals in bringing the iron back to its first state; the power of platina in assisting to bring on the altered or prepared state; and the habits of steel in nitric acid: he attributes the phenomena to a certain *permanent electric state of the surface of the metal*. I should recommend the republication of this paper in the *Philosophical Magazine*.

Professor Daniell, in his paper on Voltaic Combinations (Feb. 1836), found that on associating iron with platina in a battery charged with nitre-sulphuric acid, the iron would not act as the generating metal, and that when it was afterwards associated with zinc it acted more powerfully than platina itself. He considers the effect as explicable upon the idea of a force of heterogeneous attraction existing between bodies, and is inclined to believe that association with the platina cleanses the surface of the iron, or possibly causes a difference in the

mechanical structure developed in this particular position.

In my letter, therefore, as published in the *Philosophical Magazine* for the present month (July), what relates to the preserving power of platina on iron ought to be struck out, as

Phil. Trans. 1836, p. 114.

* *Annales des Mines*, 1832, vol. ii. p. 322; or *Mag. de Pharm.* 1830.

* *Annales de Chimie et de Physique*, vol. Hi. p. 288

³ *IUd.* 1833, vol. liv. p. 87.